Claims:

1. A filter adaptation unit suitable for producing a set of filter coefficients, said filter adaptation unit comprising:

a) a first input for receiving a sequence of samples of a first signal;

b) a second input for receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;

c) a coefficient generation unit operative for generating a first set of filter coefficients at least in part on the basis of said first and second signals, the first set of filter coefficients being such that when the first set of filter coefficients is applied by a filter on the first signal, a first estimate of the certain component in the second signal is generated;

d) a performance evaluation unit operative for generating a set of performance data elements for a filter using the first set of coefficients, each performance data element being associated to a respective frequency band selected from a set of frequency bands;

e) a noise reduction unit operative for:

i. generating a set of correction signals, said set of correction signal including a correction signal for each frequency band where the associated performance data element is indicative of an unsatisfactory performance;

ii. generating a second set of filter coefficients at least in part on the basis of:

(a) said first signal;

(b) said second signals; and

(c) the set of correction signals;

the second set of filter coefficients being such that when the second set of filter coefficients is applied by a filter on the first signal, a second estimate of the certain component in the second signal is generated;

f) an output for releasing a signal indicative of the second set of filter coefficients in a format suitable for use by a filter.

2. A filter adaptation unit as defined in claim 1, wherein a correction signal in the set of correction signals is indicative of a signal having its signal energy substantially within the frequency band for which it was generated.

3. A filter adaptation unit as defined in claim 1, wherein the performance data elements are indicative of error signal energy estimates for respective frequency bands selected from the set of frequency bands.

4. A filter adaptation unit as defined in claim 3, wherein a performance data element is indicative of an unsatisfactory performance if it is indicative of an error amplitude estimate that exceeds a certain threshold.

5. A filter adaptation unit as defined in claim 4, wherein the error amplitude estimate is indicative of a standard deviation estimate.

6. A filter adaptation unit as defined in claim 1, wherein said coefficient generation unit is operative for:

a) generating a first set of contextual information data elements at least in part on the basis of said first and second signals;

b) generating the first set of filter coefficient at least in part on the basis of the first set of contextual information data elements;

said noise reduction unit being operative for:

i. processing the first set of contextual information data elements at least in part on the basis of the set of correction signals to generate a modified set of contextual information data elements;

ii. processing the modified set of contextual information data elements to generate the second set of filter coefficients.

7. A filter adaptation unit as defined in claim 6, wherein said first set of contextual information data elements comprises:

a) a set of auto-correlation data elements for the sequence of samples of the first signal;

b) a set of cross-correlation data elements for the sequence of samples of the first signal and the sequence of samples of the second signal.

8. A filter adaptation unit as defined in claim 7, wherein said noise reduction unit is operative for modifying the set of auto-correlation data elements on the basis of said set of correction signals.

9. A filter adaptation unit as defined in claim 8, wherein said set of auto-correlation data elements forms a two-

dimensional auto-correlation matrix data structure including a plurality of entries, said noise reduction unit being operative to modify the entries of the two-dimensional matrix data structure on the basis of said set of correction signals.

10. A filter adaptation unit as defined in claim 9, wherein said noise reduction unit is operative for:

a) applying a Cholesky decomposition method to the auto-correlation matrix data structure to derive a lower triangular matrix data structure and an upper triangular matrix data structure;

b) processing the lower triangular matrix data structure and the upper triangular matrix data structure on the basis of the set of cross-correlation data elements to derive the second set of filter coefficients.

11. A method suitable for producing a set of filter coefficients, said method comprising:

a) receiving a sequence of samples of a first signal;

b) receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;

c) generating a first set of filter coefficients at least in part on the basis of said first and second signals, the first set of filter coefficients being such that when the first set of filter coefficients is applied by a filter on the first signal, a first estimate of the certain component in the second signal is generated;

d) generating a set of performance data elements for a filter using the first set of coefficients, each

performance data element being associated to a respective frequency band selected from a set of frequency bands;

e) determining for each frequency band in the set of frequency bands if the associated performance data element is indicative of a satisfactory performance or an unsatisfactory performance;

f) generating a set of correction signals, said set of correction signal including a correction signal for each frequency band where the associated performance data element is indicative of an unsatisfactory performance;

g) generating a second set of filter coefficients at least in part on the basis of:

(a) said first signal;

(b) said second signals; and

(c) said set of correction signals;

the second set of filter coefficients being such that when the second set of filter coefficients is applied by a filter on the first signal, a second estimate of the certain component in the second signal is generated;

h) releasing a signal indicative of the second set of filter coefficients in a format suitable for use by a filter.

12. A method as defined in claim 11, wherein a correction signal in said set of correction signals is indicative of a signal having its signal energy substantially within the frequency band for which it was generated.

13. A method as defined in claim 11, wherein the performance data elements are indicative of error signal amplitude estimates for respective frequency bands selected from the set of frequency bands.

14. A method as defined in claim 13, wherein a performance data element is indicative of an unsatisfactory performance if it is indicative of an error amplitude estimate that exceeds a certain threshold.

15. A method as defined in claim 14, wherein the error amplitude estimate is indicative of a standard deviation estimate.

16. A method as defined in claim 11, wherein said method further comprises:

a) generating a first set of contextual information data elements at least in part on the basis of said first and second signals;

b) generating the first set of filter coefficient at least in part on the basis of the first set of contextual information data elements;

c) processing the first set of contextual information data elements at least in part on the basis of the set of correction signals to generate a modified set of contextual information data elements;

d) processing the modified set of contextual information data elements to generate the second set of filter coefficients.

17. A method as defined in claim 16, wherein said first set of contextual information data elements comprises:

a) a set of auto-correlation data elements for the sequence of samples of the first signal;

b) a set of cross-correlation data elements for the sequence of samples of the first signal and the sequence of samples of the second signal.

18. A method as defined in claim 17, wherein said method further comprises modifying the set of auto-correlation data elements on the basis of said set of correction signals.

19. A method as defined in claim 18, wherein said set of auto-correlation data elements forms a two-dimensional auto-correlation matrix data structure including a plurality of entries, said method comprising modifying the entries of the two-dimensional matrix data structure on the basis of said set of correction signals.

20. A method as defined in claim 19, wherein said method comprises:

a) applying a Cholesky decomposition method to the auto-correlation matrix data structure to derive a lower triangular matrix data structure and an upper triangular matrix data structure;

b) processing the lower triangular matrix data structure and the upper triangular matrix data structure on the basis of the set of cross-correlation data elements to derive the second set of filter coefficients.

21. A computer readable medium including a program element suitable for execution by a computing apparatus for producing a set of filter coefficients, the filter

coefficients being suitable for use by a filter, said computing apparatus comprising:

a) a memory unit;

b) a processor operatively connected to said memory unit, said program element when executing on said processor being operative for:

i. receiving a sequence of samples of a first signal;

ii. receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;

iii. generating a first set of filter coefficients at least in part on the basis of said first and second signals, the first set of filter coefficients being such that when the first set of filter coefficients is applied by a filter on the first signal, a first estimate of the certain component in the second signal is generated;

iv. generating a set of performance data elements for a filter using the first set of coefficients, each performance data element being associated to a respective frequency band selected from a set of frequency bands;

v. determining for each frequency band in the set of frequency bands if the associated performance data element is indicative of a satisfactory performance or an unsatisfactory performance;

vi. generating a set of correction signals including a correction signal for each frequency band where the associated performance data element is indicative of an unsatisfactory performance;

vii. generating a second set of filter coefficients at least in part on the basis of:

(a) said first signal;

(b) said second signals; and

(c) said set of correction signals;

the second set of filter coefficients being such that when the second set of filter coefficients is applied by a filter on the first signal, a second estimate of the certain component in the second signal is generated;

viii. releasing a signal indicative of the second set of filter coefficients in a format suitable for use by a filter.

22. A computer readable medium as defined in claim 21, wherein a correction signal in said set of correction signals is indicative of a signal having its signal energy substantially within the frequency band for which it was generated.

23. A computer readable medium as defined in claim 21, wherein the performance data elements are indicative of error signal amplitude estimates for respective frequency bands selected from the set of frequency bands.

24. A computer readable medium as defined in claim 23, wherein a performance data element is indicative of an unsatisfactory performance if it is indicative of an error amplitude estimate that exceeds a certain threshold.

25. A computer readable medium as defined in claim 24, wherein the error amplitude estimate is indicative of a standard deviation estimate.

26. A computer readable medium as defined in claim 21, wherein said program element when executing on said processor being operative for:

a) generating a first set of contextual information data elements at least in part on the basis of said first and second signals;

b) generating the first set of filter coefficient at least in part on the basis of the first set of contextual information data elements;

c) processing the first set of contextual information data elements at least in part on the basis of the set of correction signals to generate a modified set of contextual information data elements;

d) processing the modified set of contextual information data elements to generate the second set of filter coefficients.

27. A computer readable medium as defined in claim 26, wherein said first set of contextual information data elements comprises:

a) a set of auto-correlation data elements for the sequence of samples of the first signal;

b) a set of cross-correlation data elements for the sequence of samples of the first signal and the sequence of samples of the second signal.

28. A computer readable medium as defined in claim 27, wherein said program element when executing on said

processor is operative for modifying the set of auto-correlation data elements on the basis of said set of correction signals.

29. A computer readable medium as defined in claim 28, wherein said set of auto-correlation data elements forms a two-dimensional auto-correlation matrix data structure including a plurality of entries, said program element when executing on said processor being operative for modifying the entries of the two-dimensional matrix data structure one the basis of said set of correction signals.

30. A computer readable medium as defined in claim 29, wherein said program element when executing on said processor being operative for:

a) applying a Cholesky decomposition method to the auto-correlation matrix data structure to derive a lower triangular matrix data structure and an upper triangular matrix data structure;

b) processing the lower triangular matrix data structure and the upper triangular matrix data structure on the basis of the set of cross-correlation data elements to derive the second set of filter coefficients.

31. An adaptive filter comprising:

a) a first input for receiving a sequence of samples from a first signal;

b) a second input for receiving a sequence of samples of a second signal, the second signal including a component which is correlated to the first signal;

c) a filter adaptation unit operatively coupled to said first and second inputs, said filter adaptation unit comprising:

i. a coefficient generation unit operative for generating a first set of filter coefficients at least in part on the basis of said first and second signals, the first set of filter coefficients being such that when the first set of filter coefficients is applied by a filter on the first signal, a first estimate of the certain component in the second signal is generated;

ii. a performance evaluation unit operative for generating a set of performance data elements for a filter using the first set of coefficients, each performance data element being associated to a respective frequency band selected from a set of frequency bands;

iii. a noise reduction unit operative for:

(a) determining for each frequency band in the set of frequency bands if the associated performance data element is indicative of a satisfactory performance or an unsatisfactory performance;

(b) generating a set of correction signals including a correction signal for each frequency band where the associated performance data element is indicative of an unsatisfactory performance;

(c) generating a second set of filter coefficients at least in part on the basis of:

(a) said first signal;

(b) said second signals; and

(c) said set of correction signals;

the second set of filter coefficients being such that when the second set of filter coefficients is applied by a filter on the first signal, a second estimate of the certain component in the second signal is generated;

iv. an output for releasing a signal indicative of the second set of filter coefficients in a format suitable for use by a filter;

d) a filter operatively coupled to said first input and to the output of said filter adaptation unit, said filter being operative to apply a filtering operation to the first signal on the basis of the second set of filter coefficients received from said filter adaptation unit to generate an estimate of the component in the second signal, the component being correlated to the first signal.

32. An echo cancellor comprising the adaptive filter of claim 31.

33. A filter adaptation unit suitable for producing a set of filter coefficients, said filter adaptation unit comprising:

a) means for receiving a sequence of samples of a first signal;

b) means for receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;

c) means for generating a first set of filter coefficients at least in part on the basis of said first and second signals, the first set of filter coefficients being such that when the first set of

filter coefficients is applied by a filter on the first signal, a first estimate of the certain component in the second signal is generated;

d) means for generating a set of performance data elements for a filter using the first set of coefficients, each performance data element being associated to a respective frequency band selected from a set of frequency bands;

e) means for determining for each frequency band in the set of frequency bands if the associated performance data element is indicative of a satisfactory performance or an unsatisfactory performance;

f) means for generating a set of correction signals including a correction signal for each frequency band where the associated performance data element is indicative of an unsatisfactory performance;

g) means for generating a second set of filter coefficients at least in part on the basis of:

i. said first signal;

ii. said second signals; and

iii. said set of correction signals;

the second set of filter coefficients being such that when the second set of filter coefficients is applied by a filter on the first signal, a second estimate of the certain component in the second signal is generated;

h) means for releasing a signal indicative of the second set of filter coefficients in a format suitable for use by a filter.